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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/509,370	09/28/2004	Takuya Sugawara	101249.55459US	3987

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EXAMINER

CHEN, ERIC BRICE

ART UNIT PAPER NUMBER

1765

DATE MAILED: 09/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/509,370	<b>Applicant(s)</b> SUGAWARA ET AL.	
	<b>Examiner</b> Eric B. Chen	<b>Art Unit</b> 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 28 September 2004.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) \_\_\_\_\_ is/are rejected.
- 7) ☒ Claim(s) 4-11, 13, and 14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |                                                                                                                        |                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                            | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

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## **DETAILED ACTION**

### ***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Claim Objections***

2. Claims 4-11, 13, and 14 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim. See MPEP § 608.01(n).

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-6, 9-10, 12, and 14-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Ohmi et al. (U.S. Patent Appl. Pub. No. 2002/0014666).
5. As to claim 1, Ohmi discloses a process for forming an insulating film on the surface of a substrate for electronic device, comprising at least two steps of regulating the characteristic of the insulating film (paragraphs 0090-0093), wherein the at least two

steps of regulating the characteristic of the insulating film are conducted under the same operation principle (paragraphs 0090-0093).

6. As to claim 2, Ohmi discloses that the steps conducted under the same operation principle are two or more steps selected from the group consisting of: cleaning, oxidation (paragraphs 0090-0091), nitriding (paragraphs 0092-0093), and etching of the substrate surface and/or the insulating film (12A/12B) (paragraph 0095; Figure 10A).

7. As to claim 3, Ohmi discloses that the substrate (11) for an electronic device is a semiconductor material (paragraphs 0095, 0018).

8. As to claim 4, Ohmi discloses that the substrate for an electronic device is a substrate mainly comprising single-crystal silicon (paragraphs 0017-0018).

9. As to claim 5, Ohmi discloses that the operation principle involves plasma based on a process gas comprising at least a rare gas (paragraphs 0090-0092).

10. As to claim 6, Ohmi discloses that the plasma is plasma based on microwave irradiation through a plane antenna member (RLSA) (paragraph 0041; Figure 2).

11. As to claim 9, Ohmi discloses that the process comprises a step of oxidation and the oxidation step comprises plasma treatment based on a process gas comprising at least a rare gas and oxygen (paragraphs 0090-0091).

12. As to claim 10, Ohmi discloses that the process comprises a step of nitriding and the nitriding step comprises plasma treatment based on a process gas comprising at least a rare gas and nitrogen (paragraph 0092).

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13. As to claim 12, Ohmi discloses that two or more steps selected from the group consisting of: cleaning, oxidation, nitriding, and etching of the substrate surface and/or the insulating film are conducted in the same vessel (101) (paragraphs 0090, 0092).

14. As to claim 14, Ohmi discloses that the insulating film contains a high-k (high dielectric constant) material (paragraph 0093).

15. As to claim 15, Ohmi discloses that two or more steps selected from the group consisting of: cleaning, oxidation, nitriding, and etching of the substrate surface and/or the insulating film are conducted while avoiding the exposure of the substrate surface and/or the insulating film to the air (release thereof into the air) (paragraphs 0090-0092).

***Claim Rejections - 35 USC § 103***

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

18. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi, in view of Wolf et al., *Silicon Processing for the VLSI Era*, Vol. 1, Lattice Press (1986), in further view of Mintz et al. (U.S. Patent No. 5,618,282).

19. As to claim 7, Ohmi does not expressly disclose that the process comprises a step of cleaning, and the cleaning step comprises treatment based on plasma based on a process gas comprising at least a rare gas. Wolf teaches that scrupulously clean wafers are critical for obtaining high yields for semiconductor fabrication (page 514). Mintz teaches a cleaning step comprising treatment based on plasma based (column 1, lines 15-18) on a process gas comprising at least a rare gas (column 6, lines 15-23). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a step of cleaning, and the cleaning step comprises treatment based on plasma based on a process gas comprising at least a rare gas. One who is skilled in the art would be motivated to obtain a high yield and to adopt a method known to accomplish the task of wafer cleaning.

20. As to claim 8, Mintz discloses that the step of cleaning comprises plasma treatment based on a process gas comprising at least a rare gas and hydrogen gas (column 6, lines 21-23).

21. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi, in view of Wolf.

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22. As to claim 13, Ohmi discloses that the insulating film (12a/12b) formed by the process is used as an underlying or base insulating film for an insulating film (paragraph 0100). Ohmi does not expressly disclose that the insulating film is a CVD (chemical vapor deposition) insulating film. Wolf teaches that a wide variety of films used in semiconductor fabrication are formed by CVD, including insulating films (page 161). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the insulating film using CVD (chemical vapor deposition). One who is skilled in the art would be motivated to use a widely used method, known to accomplish the task of forming an insulating film.

### ***Conclusion***

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ohmi et al. (U.S. Patent No. 6,357,385) discloses the oxidation and nitriding a semiconductor layer with a gas composition that includes a rare gas. Yashima discloses plasma oxidizing and nitriding a semiconductor surface.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B. Chen whose telephone number is (571) 272-2947. The examiner can normally be reached on Monday through Friday, 8AM to 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone

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number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EBC

Aug. 17, 2005

*EBC*

NADINE G. NORTON  
SUPERVISORY PATENT EXAMINER

